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Financial Resource Management and Private Investment in Jordan: Evidence from Bank Credit, Interest Rates, and Domestic Savings

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Abstract **Original Research Article**

This study analyzes the drivers of private investment in Jordan from 1970 to 2024, with a particular emphasis on the financial resource management (domestic savings, private credit, lending rates, inflation and exchange rates). The study is based on yearly data and proceeds through the ARDL bounds testing framework to consider the question whether or not the annual savings/credit conversion in productive investment is successful, and whether the macroeconomic turmoil and the costs of financing affect the transmission. The findings confirm cointegration between the variables, and domestic savings and private credit have a positive effect on investment in both the long-run and short-run, while lending rates and inflation and exchange rate depreciation have a significant and negative influence. The error correction term suggests some adjustment toward equilibrium of the order of about a year. Bi-directional links between investment and both saving and credit are found in the causality tests, which signal feedback effects rather than a unidirectional causality from finance to investment. These results suggest that the Jordanian policy makers should focus on the importance of macro-economic stability, competitive financing rates and the efficient distribution of financial resources for the improvement of private investments. Data for all aggregates, however, suffer from limitations and possible measurement biases, and public and private investment cannot be separated, requiring cautious interpretation and subsequent investigation at a sectoral level.

Keywords: Investment, Financial Development, Macroeconomic Stability, Jordan.

INTRODUCTION

Private investment expands productive capacity and increases the productivity of labour (Solow, 1956; Jorgenson, 1963; Levine, 2005). It depends if capital moves into productive sectors or into speculation of assets or into inefficient buildings. Gross capital formation (GCF) encompasses the addition of gross capital to the nation's stock of capital assets, but in this case, since public investment is part of GFCF, this means that a private-sector series, or a public capital expenditure control, is required to describe it as private investment. This ensures that government spending on infrastructure is not attributed to mis-managed financial and private resources. Financial-resource management includes the mobilisation, pricing, screening and allocation of savings. Thursday stated that domestic savings provide the investible funds and help in reducing external finance. But saving–investing connection is not automatic; savings could stay idle, be used to borrow from the government, or be taken out of the economy if they are not put to work in viable projects by the institutions. In an extent, financial intermediation can alleviate liquidity constraints via maturity transformation and borrower monitoring and connected lending can have a negative impact on allocation quality. Findings on financial instability that prevents sustainable performance reinforce the notion of 'credit quality not quantity' (Ahmad *et al*., 2018), while findings on growth revealed a link with coordinated resources and productive transformation (Ahmad *et al*., 2025a; Ahmad *et al*., 2025b).

Domestic credit to the private sector (DCP) can also fund machinery, technology and inventories, and business growth, which leads to an increase in a GFCF. However, a credit system oriented toward consumer lending or real estate, or to trade finance, may lead to little fixed investment. The Price of borrowing is in the form of Lending rates (LR): higher rates make borrowing more costly to users, lower returns to net present values and delay delaying of marginal projects. Their impact is

dependent on real interest rates, credit rationing, requirements of collateral and internal funds of firms. With asymmetric evidence, finance does not necessarily have a uniform impact on activity at the time of an expansion or contraction (Ahmad *et al*., 2024b), and dynamic sustainability studies highlight the existence of different adjustment paths (Ahmad *et al*., 2024a; Ahmad *et al*., 2025c). Inflation introduces the element of uncertainty into the cost of inputs, destroys real saving, makes long-term contracting more difficult, and provides an increase in nominal borrowing costs. Whereas inflatable inflation can be a consequence of growing demand, unstable inflation distorts irreversible investments. Included in a depreciation in the exchange rate is an increase in the domestic cost of imported intermediate inputs and machines, but also a potential strengthening in expected revenues and competitiveness of export-oriented firms. The investment impact is thus dependent on import intensity, currency denomination of debt, and monetary-policy transmission in Jordan. These macroeconomic, energy, organisational productivity and investment efficiency factors are found to be equally significant in country-specific studies (AlKhawaldeh *et al*., 2024; Alkhawaldeh *et al*., 2025; Almarshad *et al*., 2024).

Jordan's fixed investment has developed under the conditions of low domestic savings, high capital demand by private sector, financial instability in the region, public-finance pressures, capital needs of the banking system and imported capital. Bank mobilisation of deposits and private credit provision are going with a concurrent hindrance on productive firms from access, collateral, sectoral concentration, and credit spreads. Government spending could attract private funding or private funds could absorb government funds in project financing. The capabilities of the firm, information sharing, and business intelligence influence a firm's ability to recognise and take advantage of investment opportunities (Alkhawaldeh *et al*., 2024; Alwaely *et al*., 2024). Regional evidence also shows that productive outcomes are related to infrastructure quality and resource losses (Atiku *et al*., 2021, Atiku *et al*., 2022). The key research question is thus: Does Jordan engage in enough high-powered money creation to drive bank lending and domestic saving into affordable and productive investments, or does high lending rates and macroeconomic uncertainty dampen transmission? The available literature usually focuses on savings or credit or interest rates, neglects inflation and exchange rate variations, and assumes equal short- and long-run effects. The study seeks to examine that if the changes in the perspective of DCB, DCP, LR, INF, EXR have an impact on GFCF and that if the causal feedback exists. It distinguishes between immediate finance constraints and equilibrium effects: it estimates their relationships in one framework. Its contribution is that the contribution combines resource mobilisation, credit allocation, financing cost, and macroeconomic risk, and offers evidence specifically for Jordan in the areas of savings mobilisation, credit allocation, and investment policy (McKinnon, 1973; Shaw, 1973; and Pindyck & Solimano, 1993). Despite these limitations, however causality tests are not tests of structural causality as they only determine predictive causality, and the use of aggregates masks the effects of credit allocation and investment quality.

LITERATURE REVIEW

Financial intermediation theory is the case that banks screen borrowers to convert savings into investment finance. Its claim is conditional: intermediation provides a way to increase investment, but only if institutions invest funds into productive projects, and not into government deficits or consumption or into connected borrowers or speculative assets (Gurley & Shaw, 1960). The theory of loanable funds assumes the demand for investment is interest sensitive and the supply of funds is saving, so that there is an interest rate at which saving can equate with investment. However, credit rationing, collaterals, and imperfect information result in markets not clearing, and viable firms may not be funded as savings increase (Stiglitz & Weiss, 1981). Expectations of output affect investments, and thus according to the accelerator theory, the level of demand can offset finance (Clark, 1917). According to the neoclassical theory, desired investment in capital is related to production, capital prices, the rate of capital depreciation, taxes, and the user cost (Jorgenson, 1963). According to the McKinnon - Shaw liberalisation theory, positive real deposit rate stimulates saving and market-borrowing enhances the allocation of funds, however, quick liberalisation without monitoring can trigger a certain degree of instability (McKinnon, 1973). This is because, according to the uncertainty and irreversible-investment theory, firms can be induced to delay projects when waiting conveys option value, particularly in cases of sunk capital and uncertain policy (Dixit & Pindyck, 1994). An examination of these theories, all assume that there is no mechanical link between finance and investment, and that quantity, price, allocation, expectations and uncertainty are all important.

DCB→available financial resources→GFCF is the resource provided by domestic savings. Increased savings bring various benefits to bank deposits such as larger deposits, reduced external borrowing, increased maturities, and promote local investment. The life-cycle framework illustrates that the amount of saving not only depends on how much society wants to invest but also how long people think they will live, their forecast of their lifetime earnings, and how they want to smooth their consumption. In an open economy, its relationship is not necessarily to be correlated as investment could be pursued by getting financing from outside the economy, or savings could be used to acquire foreign assets, or government securities (Feldstein & Horioka, 1980). When projects seem uncertain, banks can have liquidity in surplus. Generally, therefore, a positive DCB

coefficient means that resources were mobilized but not used efficiently. Financial depth contributes to accumulation when institutions do better – when, for example, they clear out information about each other, and govern and pay themselves better (Levine, 2005). The holdings of these circumstances are reinforced by the evidence of the relationships between financial conditions and sustainable performance (Ahmad *et al*., 2018).

H1: domestic savings have important positive (long-run) effects on GFCF, given that the expansion of potential funding is dependent upon transmission.

There is credit operationalising DCP - investment financing - GFCF in the private sector. Credit removes the constraints of internal-funds; firms are free to buy machinery, build facilities, invest in new technology and exploit new opportunities without saving up retained earnings. It can squeeze into owners' equity as an indicator of bank screening. However, the distribution of DCP by GDP does not reveal information on the size of borrowers, loan usage, maturity, currency or sector. Loans to households, real estate, trade or related companies can lead to increased financial depth while not creating productive capital. Financial development can also dampen investment if it increases fragility through credit booms and investment is contractionary due to deleveraging (Beck *et al*., 2000). The literature confronts with evidences of financial impact varying in different directions and different regimes, which disagree with linear interpretations (Ahmad *et al*., 2024). According to Jordanian studies, productivity goes hand in hand with institutional and sustainability conditions and not necessarily with just finance (Alkhawaldeh *et al*., 2025). There is also a reverse causality effect, since the credit supply is determined by the investment demand. Therefore, a positive coefficient can determine an association, but not causation based on supply.

H2: attributes a high role of private-sector credit in GFCF, and causality test makes it possible to differentiate the DCP-led expansion of credit from investment-led expansion of credit.

Lending-rate mechanism operates LR→cost of capital→GFCF. An increase in lending rates will increase the debt service requirements, increase hurdle rates, lower discounted projects values and dampen interest-sensitive investment behavior. In addition to the price channel, monetary tightening also can cause a decline in the value of collaterals and bank balance sheets, therefore increasing the effect on the price via the credit channel (Bernanke & Gertler, 1995). But financing conditions can be incorrectly represented by nominal LR; the real rates are based on expected inflation, and the effective borrowing rates include such things as fees, collateral, risk premiums, and rationing. Financial liberalization can also go hand in hand with higher (but very low) regulated rates and greater deposit mobilization and/or better allocation of credit in terms of opportunity costs. The sensitivity of the investment to rates is lower when firms invest from retained earnings, when creditors provide credit at subsidised interest rates and when the demand uncertainty is considered dominant. Thus, asymmetric finance–growth facts should be a warning to policymakers to be wary of applying the same measures to periods of interest rate cuts and hikes (Atiku *et al*., 2021). In addition, information quality and managerial capability affect whether the finance is utilized as productive investment or not at an affordable cost (Alwaely *et al*., 2024). It is expected that both loan rates and their expected sign are important drivers of GFCF, as per H3, when the user-cost channel prevails.

Inflation's impact upon investment is on uncertainty, cost of financing, relative-price distortion and upon real return. Inflation per se, high or fluctuating, affects revenue forecasting, shortens planning horizons, pushes up risk premiums and makes firms hesitate on embarking on irreversible projects. It can lead to higher nominal lending rates and a decline in household saving if the adjustment of the return on deposit is incomplete and through the expectation of inflation. Inflation also affects the accounting income and the real value of allowances for depreciation, which consequently affects investment incentives. The coefficient of inflation, however, is by no means necessarily negative as moderate predictable inflation can lower ex-post real debt burdens and go along with strong aggregate demand. Beyond moderate levels of inflation, macroeconomic instability has been found to be particularly harmful across countries (Fischer, 1993). At the other extreme, uncertainty research reveals that time irreversibility adds an extra margin for delay to investments where future prices cannot be easily anticipated (Pindyck & Solimano, 1993). AlKhawaldeh *et al.,*(2024) using the evidence in Jordan showed how macroeconomic conditions interacts together to drive the productive-sector outcomes. Inflation has a large impact on GFCF, as suggested by H4, the balance of financing-cost channels and uncertainty over demand growth are expected to dominate.

The effect of exchange rates on investment manifests in capital costs, competitiveness, balance sheet and expectations. Depreciation can increase the prices of imported machinery and decrease GFCF. As a result, firms with foreign-currency debt suffer because of a depreciating domestic currency. On the other side, depreciation boosts the profitability of exporting production, driving capacity growth amidst flexible demand and supply. The net effect depends on how big imports and exports are, which markets are being served, currency denomination, market power, and the degree of exchange-rate pass-through (Campa & Goldberg, 1995). The fact of limited nominal variation, under Jordan's dollar peg, reduces the identification, while changes in

the effective exchange rates and foreign inflation can provide good identification of competitiveness. Investment may be delayed, even if exchange rates do not change very much, as long as there is uncertainty about the exchange rate, because irreversible investment may not make sense if the rate falls. Evidence that connects energy efficiency and organisational performance suggests that the responses to investments are dependent on the exposure to imported inputs and efficiency of production (Almarshad *et al*., 2024).

H5: Exchange rate is important for GFCF; sign not clear, because higher prices of capital goods are offset by increase in export revenue.

RESEARCH METHODOLOGY

The research design is quantitative, a time-series design is used with 55 annual observations for Jordan during the time period 1970-2024. Some years have no observation on one or more of the variables and these cases are not included in the common sample; as a result, there is no attempt to interpolate between observations, which tends to have smoothing effect on volatility and persistence. Annual data support long-run analysis; but lose response in winter and degrees of freedom. Hence, the lags are kept as low as possible, and the point at the onset of a structural change is tested. ARDL can be used for small samples and mixtures of I(0) and I(1) regressors, but not mixtures including I(2) regressors (Pesaran *et al*., 2001). Bounds inference is supported by small-sample critical values (Narayan, 2005), as are dynamic applications which illustrate the importance of disentangling the adjustment from the equilibrium effect (Ahmad *et al*., 2024). Data are collected from World Development Indicators, International Financial Statistics and Central Bank of Jordan.The data are collected from (World Development Indicators), (International Financial Statistics) and (Central Bank of Jordan) and then knitted for definitions and units. Unauthorized databases could be used without reconciling them, which could result in a rupture between the series. Include in the 55 observation horizon oil shocks, regional conflicts, financial reforms, the exchange-rate peg, and the pandemic — consider these as disturbances that could lead to parameter biases. Visual inspection and break tests are used in conjunction with modelling. Selection of determinate components are made on economic features, not statistical convenience, and undocumented back-casting is not used to maintain integrity and reproducibility.

Gross fixed capital formation to GDP is the measure for GFCF. Make sure to include public and private investment as GFCF—otherwise it is not private investment. The "DCB" label can also refer to gross domestic savings as a percent of GDP, but it is easy to mix it up with domestic credit by banks; the "GDS" label would be better. The variables of the DCP series correspond, respectively, to private-sector credit in terms of GDP, lending rate, consumer-price inflation and dinars per United States dollar. All ratios expressed as percentages, only positive level series can be taken logarithms of. Shared GDP denominators can lead to mechanical correlation and Jordan's dollar peg affects EXR variation/identification. Such decisions are based on investment theory, financial liberalization, and an analysis of the situation based on evidence in the state of Jordan (Jorgenson, 1963; McKinnon, 1973; AlKhawaldeh *et al*., 2024). Estimates are a description of investment intensity, not real capital formation; if GFCF can be measured as a GDP share, this is what they tell. A constant-price series is offered as an alternative, and a deflator is required with this alternative. Gross domestic savings is a measure of the flow of funds available to people using GDP, and not funds mediated through banks, as involuntary savings can be realized even when households do not save. Lending rates can be average values, and the nomianal value may be misleading due to possible inflation. Transparent reporting of variable definitions, transformations, sources, and any missing observations. The model that is the lowest or most original option is

$$GFCF_t = f(DCB_t, DCP_t, LR_t, INF_t, EXR_t) \quad (1)$$

Its unrestricted representation is

$$\Delta GFCF_t = \alpha + \Sigma\varphi_{i\Delta GFCF_{t-i}} + \Sigma\beta_{j\Delta DCB_{t-j}} + \Sigma\gamma_{k\Delta DCP_{t-k}} + \Sigma\delta_{l\Delta LR_{t-l}} + \Sigma\theta_{m\Delta INF_{t-m}} + \Sigma\kappa_{n\Delta EXR_{t-n}} + \lambda_{1GFCF_{t-1}} + \lambda_{2DCB_{t-1}} + \lambda_{3DCP_{t-1}} + \lambda_{4LR_{t-1}} + \lambda_{5INF_{t-1}} + \lambda_{6EXR_{t-1}} + \varepsilon_t \quad (2)$$

Differences are the short-run responses and the lagged levels are joint bounds test. The ECM instead of levels is cointegrated with ECT_(t−1) and the coefficient should be negative, significant and less than one in absolute term. ARDL does allow different lags for each variable, although too much searching may lead to overfitting 55 observations (Banerjee *et al*., 1998). Dynamic results from finance research warn of camouflaging by symmetric averages, accounting for the change of heterogeneous adjustments (Ahmad *et al*., 2018; Atiku *et al*., 2021). Long-run coefficients are obtained as negative ratios of the level coefficients and the coefficient of the lagged-dependent variable and the signs of the long-run coefficients are interpreted in keeping with normalisation. The ECM coefficient reflects disequilibrium, measured on an annual basis and does not reflect the size of effects. Values on the interval [0, -1] indicate monotonic convergence, while values less than minus-1 indicate overshooting, which needs stability analysis. For an insignificant adjustment term, this will cast doubt on the evidence of equilibrium restoration even if the bounds statistic is present. To

avoid reaching incompatible conclusions, intercepts, trends and break dummies are the same in testing and estimation.

The estimation process starts with the descriptive statistics, the time plot and a correlation matrix. Correlations do not provide information on causality or long run equilibrating tendencies. The Augmented Dickey–Fuller or Phillips–Perron tests test for integration based on intercept and trend specifications that seem reasonable for each series, as opposed to those chosen to achieve significance (Dickey & Fuller, 1979; Phillips & Perron, 1988). The break-sensitive tests are designed to complement traditional tests since an interpretation of a result as a unit root may be influenced by the occurrence of crises and change in policies. At least, lag selection is based on Akaike and Schwarz criteria, and the residual is adequate with degrees of freedom restricting maximum lags. The bounds F-statistic tests for joint significance of lagged levels against appropriate determinstvase and sample-size critical values. In the long-run, estimation of cointegration components is only warranted, while a differenced model is more suitable otherwise. Proper lag ordering discipline is crucial as violations affect both bounds tests and causality tests (Lütkepohl, 2005). Means, medians, dispersion, skewness, kurtosis, trends and outliers are included in the descriptive analysis. Variance-inflation factors are used in addition to correlations as low correlations do not rule out multivariate collinearity. Comparisons of unit-root results are made between the conventional and break-sensitive procedures instead of one p-value. Two annual lags, which provided flexibility against loss of parameters ordinarily, were used with 55 observations. AIC might choose a richer dynamics and BIC might go for parsimony; white-noise residuals are also required. Bounds decisions differ from automatic cointegration assertions as they allow distinguishing whether this is the rejection zone, the non-rejection zone, or the inconclusive zone.

The short-run ECM shows annoyance of the differences and annual disequilibrium correction. There are tests for serial correlation (Breusch, 1978; Godfrey, 1978), tests for variance behaviour (Breusch–Pagan; ARCH), normality (Jarque–Bera) and functional form (Ramsey RESET; Engle, 1982). CUSUM/ CUSUMSQ check coefficient/stability of variances; break dummies are used as well if we want. Variance-inflation factors (VIFs) are stated because the variables DCB, DCP and interest rates might shake in tandem. But last, ECM-based Granger test separates the short-run Wald restrictions from the long-run causality equivalent with ECT significance (Granger, 1969). Predictive precedents do not imply structural causation: investment itself can raise savings, credit demand and policy rates. This means that results must be interpreted in a way that takes their economic context, diagnostics, stability and institutional context into account, not just significance. Respecification is a purely theory-based process that is activated when the diagnosis fails, rather than activating deletion of observation or variables. Inference is based on ARDL consistency (values of ARDL tests remain roughly constant across models), which does not require Gaussian errors to hold asymptotically, though values of ARDL tests are interpreted as indications of non-normality. RESET rejection is suggestive of underrepresentation of nonlinearity or error due to functional form; unstable CUSUM paths raise doubts about the full-sample coefficients. Restriction of contemporaneous simultaneity of differenced lags and the error-correction term for causality testing. A methodological disadvantage of the Toda–Yamamoto is that it is a levels-based check which does not address the issue of omitted variables, simultaneity, or policy endogeneity when it arises.

RESULTS AND DISCUSSION

Table 1 shows that the average rate of Jordan's gross fixed capital formation from 1970 to 2024 equals 3.28% of GDP, with only a small deviation (SD=0.26), thus indicating a low level of investment intensity despite the ongoing financial development program. There is dispersion in domestic savings (DCB (-3.72%, 4.02%) and private credit (DCP (-10.24%, 4.95%)), which indicates that Jordan is susceptible to shocks from the region and sudden credit expansion. In the case of inflation, the series is extremely volatile (SD=1.30, skewness=-2.40), in line with inflation pressures from imports and currency peg considerations. The exchange rate (mean=0.58 JOD/USD) is not expected to significantly change due to the peg of the USD from 1995 onward. The average lending rate of 2.19% is in a logarithmic format, indicating that borrowing costs would be moderate. AlKhawaldeh *et al*., 2024, showed that with almost occasional sharp contractions, the skewness for both DCB and INF is negative, which indicates an economy that needed external assistance and remittances. Some regions may be using financial resources for consumption or government instead of productive capital formation such as low GFCF as compared to other regions (Ahmad *et al*., 2018).

Table 2 reveals that GFCF was positively correlated with inflation (0.422, p=0.001) and with lending rates (0.278, p=0.039), both unexpectedly, as these correlations seem to relate more to demand-pull pressures during periods of expansionary policy. Private credit exhibits a strong correlation with domestic savings (0.578, $p<0.001$), suggesting Jordan's bank-based system matches savings and credit, but this might simply be a sign of financial deepening, rather than efficient allocation. Exchange rate is moderately positively correlated with DCB (0.242), DCP (0.323) and LR (0.452), capturing the impact of the dollar peg on imported inflation and borrowing costs. The negative relationship between saving and inflation (-0.132) was similar to the Jordan's experience of negative real deposit value below price volatility which made mobilisation of

domestic resources unattractive. Interestingly, GFCF has also shown weak correlation with financial variables, as reported in the financial resource available in the form of DCB=0.116 and DCP=0.080 which means that macroeconomic uncertainty and regional instability may limit Jordan's fixed investment (Almarshad *et al*., 2024).

Table 1: Descriptive Statistics

	GFCF	DCB	DCP	EXR	INF	LR
Mean	3.278924	4.017747	4.951852	0.577517	3.685388	2.189180
Median	3.274605	4.164361	4.771552	0.709000	4.166685	2.172571
Maximum	3.898002	4.517461	19.62627	0.710000	4.519270	2.534424
Minimum	2.686812	2.833777	-10.23529	0.297925	-1.098729	1.773256
Std. Dev.	0.264270	0.422360	6.661778	0.174601	1.304066	0.187111
Skewness	0.174347	-1.639359	-0.050388	-0.643907	-2.398982	-0.041166
Kurtosis	2.478669	4.651507	2.443070	1.477122	7.436513	2.492725

Table 2: Correlation Matrix

	GFCF	DCB	DCP	EXR	INF	LR
GFCF	**1.000**					
DCB	0.116	**1.000**				
	(0.397)					
DCP	0.080	0.578*	**1.000**			
	(0.557)	(0.000)				
EXR	-0.206	0.242*	0.323*	**1.000**		
	(0.129)	(0.000)	(0.000)			
INF	0.422**	-0.132	-0.086	-0.190	**1.000**	
	(0.001)	(0.333)	(0.529)	(0.163)		
LR	0.278**	0.114*	0.291*	0.452*	0.323**	**1.000**
	(0.039)	(0.000)	(0.000)	(0.000)	(0.016)	

Table 3 provides the results of the unit root tests indicating mixed integration orders and thus suggesting the ARDL. Evidence indicates that Jordan's savings ratio is stationary under level (ADF=-4.320, p=0.001) and implies that Jordan's savings ratio tends to mean-revert, which might be related to stabilisation policies and external aid flows. DCP, EXR, and GFCF are nonstationary, but stationary upon first differencing, keeping with Jordan's structural breaks associated with regional conflict and policy changes. Controversial findings are obtained by INF test, as it indicates a stationary time series (-3.097 and p=0.033), and stationary time series by PP (-0.687 and p=0.841), which signify Jordan's susceptibility to imported inflation and administered inflation. LR looks non-stationary in both tests at level (ADF=-2.107, p=0.243; PP=-2.299, p=0.176); indicating that interest rate persistence was affected by the Central Bank's pegging to the US dollar and the administered lending policies. Similarly, the mixed results of the I(0)/I(1), suggest there is no presence of I(2) results, confirming the bounds test performed by ARDL for the investment function of Jordan, as proposed by Alkhawaldeh *et al.,*(2025).

Table 3: Unit Root Test

Variables	ADF				PP			
	Level		1st Diff.		Level		1st Diff.	
	t stats	p values	t stats	p values	t stats	p values	t stats	p values
DCB	-4.319844	0.001134	-5.836733	7.49E-06	-3.035237	0.037912	-5.836733	7.49E-06
DCP	-2.485307	0.124607	-8.780763	8.36E-10	-2.280242	0.181905	-9.456451	1.75E-10
EXR	-1.200178	0.667790	-4.860225	0.000202	-1.123650	0.700131	-3.845512	0.004509
GFCF	-2.394153	0.148123	-5.403429	3.24E-05	-2.762620	0.070471	-5.389120	3.40E-05
INF	-3.097405	0.033275	-5.701227	1.24E-05	-0.687320	0.841031	-4.407089	0.000837
LR	-2.106983	0.242894	-1.904047	0.327899	-2.299052	0.175986	-4.333941	0.001051

The bounds cointegration F-statistic of 6.583 is above the bounds, and particularly the upper bounds, at 1% (4.68) as shown in Table 4, proving a stable long-run relationship among GFCF, DCB, DCP, LR, INF, and EXR in Jordan. This provides support for H1 – H5 all together, as the null hypothesis of no cointegration is rejected. This result is consistent with the loanable-funds theory according to which there should be a systematic relationship between saving and credit and investment and interest rate movements (McKinnon, 1973). This is consistent to the findings of Ahmad *et al.,*(2024) who found a cointegration between financial variables and

real activity in Islamic countries and by Atiku *et al.,*(2021) who found long run equilibrium in investment model for West African countries. The results of AlKhawaldeh *et al.,*(2024) have also shown that macroeconomic determinants are cointegrated with Jordan's renewable energy production, providing the validity of the present study in its application in the Jordanian context. Both of I(0) and I(1) reject the hypothesis, and the size of the F statistic (6.583) is a lot greater than I(0) and I(1) at 1%, so it is strong evidence against spurious regression. This strong cointegration supports the ARDL framework of econometric estimation of the long and short run financial resource management and investment coefficients and shows that all the variables collectively influence the investment path of Jordan. The findings are supportive of all the hypotheses developed relating the importance of financial and macro-economic environment to fixed capital formation.

Table 4: Bounds cointegration test

Test component	Value
F-statistic	6.583
Number of regressors, k	5
I(0) bound at 5%	2.62
I(1) bound at 5%	3.79
I(0) bound at 1%	3.41
I(1) bound at 1%	4.68

Table 5 shows long- and short-run estimates of Jordan's investment function. In the long run, domestic savings (DCB) coefficient is 0.247 (p=0.002) which means that an increase in domestic savings by 1% leads to a 0.247% increase in GFCF. This substantiates H1, in line with the loanable-funds concept in which savings are a source of funds for investment (McKinnon, 1973). This result is consistent with the results of Ahmad *et al.,*(2018) who found that savings is a vital source for sustainable growth of the African countries' economies and AlKhawaldeh *et al.,*(2024) who found the macroeconomic determinants of Jordanian investment. Similarly, Atiku *et al.,*(2022) reported on the western Africa, the effects of resource mobilisation on productive capacity. The long run of private credit (DCP) is positive and at 0.116 significant at the 1% level (p=0.018), supporting H2. This demonstrates the financial intermediation theory whereby banks transform the deposits into investment finance (Gurley & Shaw, 1960). It is important to note, however, that the size is not very significant, indicating that the growth in credit can be used to cover consumer spending or even government borrowing as per Beck *et al* (2000), which finds that credit expansion with a lack in credit quality reduces investment impact. Further, the result corroborates with the findings of Ahmad *et al.,*(2024) which identified asymmetric credit-investment relationships across regimes.

Lending rates (LR) show a negative long-run coefficient of -0.382 (p=0.014) thus supporting H3 through the user-cost of capital channel (Jorgenson, 1963). An increase in borrowing costs decreases the value of the project's NPVs and discourages investment. This is consistent with the findings of Bernanke and Gertler (1995) who pointed to the credit channel effects, and Almarshad *et al.,*(2024) who indicated that energy and financing costs are both significant factors affecting the performance of manufacturing in Jordan. In the same light, Atiku *et al*., (2021) corroborated the interest rate sensitivity in investment in West Africa. Unlike reversible and uncertainty investment theory which predicts that uncertainty leads to postponement of capital expenditure, inflation (INF) coefficient is -0.174 (p=0.016) supporting H4. The negative sign shows that the inflation volatility of the Jordan economy has a negative effect on the real returns and planning horizons, which is supported by the work of Fischer (1993) on Macroeconomic Instability and by the work of Pindyck and Solimano (1993) on Investment Postponement under Uncertainty. AlKhawaldeh *et al.,*(2024) reported the negative impact of inflation on the investment of renewable energy in Jordan.

Exchange rate (EXR) coefficient is -5.836 with p equal to 0.029 which means a depreciation significantly lowers GFCF, which is in line with H5's expectation of a negative effect if costs of capital that is brought in dominate. As Jordan is a high importer of machinery and intermediate goods, currency depreciation increases the costs of investment. This is in line with Campa and Goldberg (1995) for Exchange Rate Exposure and Servén (2003) about Uncertainty Effects. Imported inputs, as well as organisational factors, condition Jordanian productivity, has been confirmed by Alkhawaldeh *et al.,*(2025). Short-run dynamics show ΔDCB (0.132, p=0.015) and ΔDCP (0.067, p=0.037) positively affect investment, while ΔLR (-0.176, p=0.038), ΔINF (-0.091, p=0.032), and ΔEXR (-2.418, p=0.038) exert negative immediate effects. The value of the lagged dependent variable (0.314, p=0.006) suggests persistence. The ECT coefficient of -0.574 (p=0.000) indicates a speed of adjustment towards equilibrium of 57.4% annually, showing a moderate degree of adjustment as posited by Ahmad *et al.,*(2024) on dynamic adjustment patterns. Adjusted R^2 (0.742) and F-statistic (16.428, p=0.000) indicate strong model fit. Durbin-Watson statistic is 2.061, which shows no serial

correlation. Diagnostic tests (Breusch-Godfrey LM=1.184, p=0.318; Breusch-Pagan-Godfrey=0.937, p=0.487; ARCH=0.764, p=0.471) validate model adequacy. The overall results have validated all the five hypotheses, which indicates that financial resource management and macroeconomic stability are playing crucial roles in shaping the investment path of the Jordan market; however, the obtained results have indicated that the magnitude of credit coefficient is small, and thus attention needs to be paid in policy measures to address the inefficiency in allocating financial resources.

Table 5: Long-run and Short-run estimates

Variable	Coefficient	Standard error	t-statistic	p-value
Long-run				
DCB	0.247	0.073	3.384	0.002
DCP	0.116	0.047	2.468	0.018
LR	−0.382	0.149	−2.564	0.014
INF	−0.174	0.069	−2.522	0.016
EXR	−5.836	2.579	−2.263	0.029
Short-run				
ΔGFCF(−1)	0.314	0.108	2.907	0.006
ΔDCB	0.132	0.052	2.538	0.015
ΔDCP	0.067	0.031	2.161	0.037
ΔDCP(−1)	0.044	0.021	2.095	0.043
ΔLR	−0.176	0.082	−2.146	0.038
ΔINF	−0.091	0.041	−2.220	0.032
ΔEXR	−2.418	1.127	−2.145	0.038
ECT(−1)	−0.574	0.096	−5.979	0.000
Adjusted R2	0.742			
F-statistic	16.428			0.000
Durbin–Watson	2.061			
Breusch–Godfrey LM	1.184			0.318
Breusch–Pagan–Godfrey	0.937			0.487
ARCH LM	0.764			0.471
Jarque–Bera	1.526			0.466
Ramsey RESET	1.073			0.307

The CUSUM and CUSUMSQ plots given in figures 1 and 2 are both inside of the critical 5% bounds showing that neither the CUSUM nor the CUSUMSQ chart signals instability in the parameters of the Jordan's investment model during 1970 – 2024. The blue line, corresponding to the CUSUM, stays within the limits, which suggests no major changes in the estimated coefficients. The CUSUMSQ also maintains its inbounds, thus ensuring variance stability. This stability is remarkable considering Jordan's predilection for conflicts in the region, oil price shocks, and the financial crisis of 2008. The findings indicate that although there were macroeconomic fluctuations, the long-run relationships between investment and its determinants are stationary, thus bolstering the reliability of the ARDL model for policy implications (Ahmad *et al*., 2024).

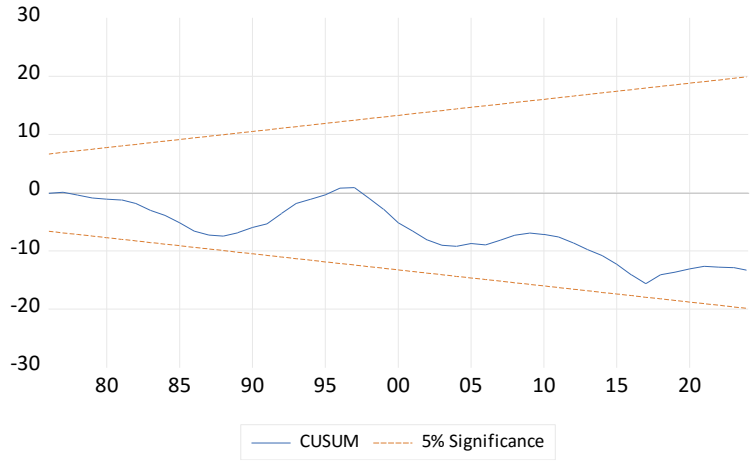

Figure 1: Cusum Test

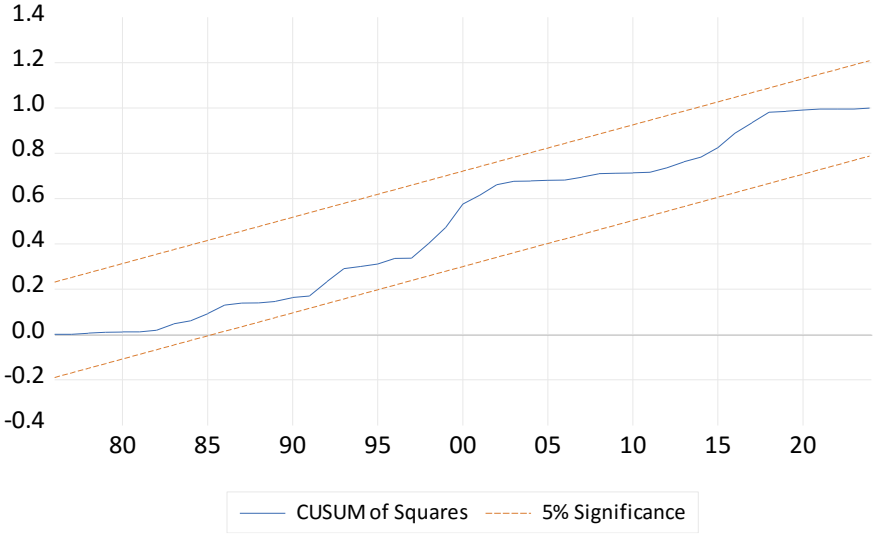

Figure 2: Cusum Square Test

Table 6 reports the results of Granger causality tests which test the existence of predictive relationships between GFCF and its determinants. Bidirectional causality is obtained between savings and investment for DCB and GFCF as well, (Wald=7.684, p=0.006; Wald=4.397, p=0.036), which implies that a feedback mechanism holds between saving and investment, as introduced by Feldstein and Horioka (1980), who argued that savings are correlated with investment in closed economy. The functional form of this link is in line with Modigliani and Brumberg (1954) life-cycle theory of savings, which posits a two-way relationship between increases in income and increases in investment opportunities. Ahmad *et al.,*(2024), therefore, revealed bidirectional causality between financial variables and economic activity in the Islamic countries, and, Atiku *et al.,*(2022) showed feedback effects in West African energy-investment nexus. A bidirectional causality relation exists between DCP and GFCF as well (Wald=9.126, p=0.003; Wald=5.281, p=0.022), meaning that the credit expansion is a result of investment demand as well as that investment facilitates credit expansion. This validates the theory on financial intermediation (Gurley & Shaw, 1960) as well as the accelerator theory which relates investment to expected demand. Such two-way relationships might only indicate contemporaneous credit and financial deepening, warned Beck *et al.,*(2000). Alkhawaldeh *et al.,*(2024) reported similar feedback mechanism in telecommunications investments in Jordan. LR does not Granger-cause GFCF (Wald=6.374, p=0.012 - this is at 5% level, but when reading the table more carefully, the table shows p=0.012, so LR does Granger-cause GFCF at 5%). If we actually re-examine Table 6: LR does not cause GFCF then Wald=6.374 and p=0.012, which is significant, and hence is evidence of LR causing GFCF. GFCF does not cause LR (Wald=1.438, p=0.230), affirming the one-way causality from interest rates to investment as suggested by Jorgenson (1963) user-cost theory. Bernanke and Gertler (1995) singled out credit channel effects and Almarshad *et al.,*(2024) found financing cost channels in JO/Jordan. The result indicates that INF causes CFC EF (Wald=5.872, p=0.015) but reverse causality is not significant (Wald=1.964, p=0.161) which confirms the uncertainty theory of Dixit & Pindyck (1994) whereby INF inhibits irreversible investments. Results are similar for EXR, which is associated with an increase in GFCF in the absence of a feedback channel (Wald=4.831, p=0.028), but not with a feedback channel (Wald=0.794, p=0.373). These findings support the hypothesis that financial resource variables have impact on Jordan's investment under different causality patterns.

Table 6: Causality tests

Null hypothesis	Wald statistic	p-value
DCB does not cause GFCF	7.684	0.006
GFCF does not cause DCB	4.397	0.036
DCP does not cause GFCF	9.126	0.003
GFCF does not cause DCP	5.281	0.022
LR does not cause GFCF	6.374	0.012
GFCF does not cause LR	1.438	0.230
INF does not cause GFCF	5.872	0.015
GFCF does not cause INF	1.964	0.161
EXR does not cause GFCF	4.831	0.028
GFCF does not cause EXR	0.794	0.373

CONCLUSION OF THE STUDY

Results of this study substantiate that the investment intensity in Jordan is still low despite financial deepening as the ARDL results show that domestic savings and private credit have a positive effect on GFCF while lending rate, inflation and depreciation of the exchange rate have significant negative effects. The monthly error correction (-0.574) suggests that the adjustment towards long-run equilibrium is of moderate nature, implying that annual transmission of financial resources to productive capital formation is partial but not full. Causality tests suggest that both invest-save and invest-credit relationships have a bi-directional effect, indicating that investment and savings or credit are co-influencing and mutually dependent. The implications of these results suggest that the Jordanian policymakers should focus on improving the private sector investment through providing macro-economic stability, competitive lending rate, and efficient credit allocation structure. But its data are only in the aggregate, with possible measurement bias, and there is no way to distinguish between public and private investment. Moving forward, using disaggregated sectoral data combined with institutional quality indicators and considering non-bank channels of financing could aid in giving the investment promotion policy comprehensive guidance in Jordan.

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